[0104] The electrode arrangements described in connection with FIGS. **6**A, **6**B, **7**A, and **7**B above can be employed in any of the electrochemical sensors described herein. Moreover, some embodiments of the present disclosure can include electrode arrangements that combine aspects from the parallel bar arrangement discussed in connection with FIG. **6**A and from the concentric ring arrangement discussed in connection with FIG. **6**B. Additionally or alternatively, some embodiments of the present disclosure can include electrode arrangements that combine aspects from the coplanar arrangement discussed in connection with FIG. **7**A and from the non-coplanar arrangement discussed in connection with FIG. **7**B. For example, the electrodes **520**, **522** of the electrochemical analyte sensor described in connection with FIG. **5** can be arranged as non-coplanar flattened rings (as described in connection with FIGS. **6**A and **7**B, for example) or as approximately coplanar parallel bars (as described in connection with FIGS. **6**B and **7**A, for example). Similarly, the electrochemical sensors **260** and **320** described in connection with FIGS. **2** and **3** can be implemented with sensor electrodes arranged similarly to the electrodes **620**, **622** in FIG. **6**A, the electrodes **630**, **632** in FIG. **6**B, the electrodes **720**, **722** in FIG. **7**A, and/or the electrodes **750**, **752** in FIG. **7**B.

[0105] When the dimensions of the working electrode in any of the configurations described herein are made sufficiently small (e.g., a width of less than 25 micrometers, about 10 micrometers, or less than 10 micrometers) the current passing through the working electrode can be in the nA range. At such low currents, the diffusion layer thickness induced at these electrodes is very small (on the order of a few micrometers). As a result, the diffusion of analytes to the electrode is extremely efficient and a steady state current can be obtained. In some embodiments, the induced consumption (electrolysis) of analytes is also decreased and a continuous mode of operation of the sensor can be realized. The relatively small diffusion layer associated with a small-dimensioned working electrode can also reduce adverse effects associated with the mass transfer of analytes to the electrode surface, such as noise caused by irregular mass transfer of analytes.

[0106] By configuring the working electrode with sufficiently small dimensions (e.g., a width of less than 25 micrometers, about 10 micrometers, or less than 10 micrometers), the charging current resulting from the capacitive effects of the electrode-electrolyte interface can beneficially be reduced. This is because the capacitive current is proportional to the electrode area.

[0107] In general, configuring a working electrode as a microelectrode with a dimension less than 25 micrometers (or less than 10 micrometers) can provide various advantages over larger-dimensioned electrodes. Moreover, the smaller currents associated with microelectrode-sized working electrodes makes them particularly well suited for their use in a medium with high resistance, such as the polymeric materials that may be used in the eye-mountable devices described herein.

[0108] While various aspects and embodiments have been disclosed herein, other aspects and embodiments will be apparent to those skilled in the art. The various aspects and embodiments disclosed herein are for purposes of illustration and are not intended to be limiting, with the true scope being indicated by the following claims.

What is claimed is:

1. An eye-mountable device, comprising:
- a transparent polymeric material having a concave surface and a convex surface, wherein the concave surface is configured to be removably mounted over a corneal surface and the convex surface is configured to be compatible with eyelid motion when the concave surface is so mounted;
- a substrate at least partially embedded within the polymeric material;
- an antenna disposed on the substrate;
- a two-electrode electrochemical sensor disposed on the substrate and including:
  - a working electrode having at least one dimension less than 25 micrometers; and
  - a reference electrode having an area at least five times greater than an area of the working electrode; and
- a controller electrically connected to the electrochemical sensor and the antenna, wherein the controller is configured to: (i) apply a voltage between the working electrode and the reference electrode sufficient to generate an amperometric current related to the concentration of an analyte in a fluid to which the eye-mountable device is exposed; (ii) measure the amperometric current; and (iii) use the antenna to indicate the measured amperometric current,
- wherein a portion of the transparent polymeric material at least partially surrounds the working electrode and the reference electrode such that an electrical current conveyed between the working electrode and the reference electrode is passed through the at least partially surrounding portion of the transparent polymeric material.

2. The eye-mountable device according to claim **1**, wherein the electrochemical sensor is embedded within the transparent polymeric material such that the measured amperometric current is based on an amount of the analyte that diffuses through the transparent polymeric material to cause an electrochemical reaction at the working electrode.

3. The eye-mountable device according to claim **1**, wherein the working electrode is situated sufficiently proximate the concave surface to detect an amount of the analyte dissolved in a tear film layer interposed between the corneal surface and the concave surface while the transparent polymeric material is mounted over the corneal surface.

4. The eye-mountable device according to claim **1**, wherein the working electrode is a microelectrode having at least one dimension approximately equal to 10 micrometers.

5. The eye-mountable device according to claim **1**, wherein the working electrode is a microelectrode having at least one dimension less than 10 micrometers.

6. The eye-mountable device according to claim **1**, wherein the working electrode and the reference electrode are each disposed on the substrate so as to be approximately coplanar.

7. The eye-mountable device according to claim **1**, wherein the working electrode is disposed on the substrate at a closer distance to the concave surface than the reference electrode, such that the working electrode and the reference electrode are non-coplanar.

8. The eye-mountable device according to claim **1**, further comprising a reagent that selectively reacts with the analyte, wherein the reagent is localized proximate the working electrode.

9. The eye-mountable device according to claim **8**, wherein the reagent is localized away from the reference electrode.